PATENT SPECIFICATION

DRAWINGS ATTACHED

925,102

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COMPLETE SPECIFICATION

Tanker Vessels

We, SOCIETE INDUSTRIELLE GENERALE DE MECANIQUE APPLIQUEE S.I.G.M.A., a French body corporate of 61, Avenue D. Roosevelt, Paris (8e), France, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to tanker vessels (i.e. ships) hereinafter referred to as "tankers", and used for the storage and transport of liquids, particularly hydrocarbon liquids.

It is well known that most tankers are provided with a piping system whereby, at least in principle, different qualities or kinds of liquid can be loaded onto and discharged from the tanker and moved about various tanks thereof. Normally, however, most tankers transport on each journey the same liquid in all their tanks and in many cases the same liquid is carried on each successive journey. In any case, at least 90% of tankers transport only one liquid at a time.

It is an object of the present invention to provide an improved tanker adapted for the transport of a single liquid product.

According to the present invention there is provided a tanker in which the tanks are defined by fore-and-aft and athwartships bulkheads, wherein the lower portions of the athwartships bulkheads are provided with valve openings of large area which are arranged to be closed by gates having control means operable from outside the tanks and wherein high capacity pump means are connected to one of the said tanks in such manner that during emptying (or filling) of the tanks liquid can flow from tank to tank to (or from) the said pump means in the fore-and-aft direction of the tanker by way of the valve openings.

Preferably ballast tanks will be provided such that the trim of the ship can be so arranged that liquid can flow from one tank to another under gravity. The ballast tanks also allow efficient pumping to be achieved in a partly filled tanker.

Preferably the pump means, for example constituted by two pumps, will be positioned immediately adjacent the tank at the stern of the tanker. This is advantageous in that long suction manifolds can be dispensed with. Thus in a tanker in accordance with the present invention, a pump having a low suction efficiency and a high velocity of rotation can be used. This type of pump is relatively simple and cheap in comparison with pumps having long suction manifolds which have previously been used in oil tankers.

The cross-sectional area and configuration of the valve openings will be calculated to provide pressure losses corresponding to the normal rate of unloading. Thus in a tanker having five longitudinally arranged central storage tanks the openings should be such that the difference of level between one tank and another during open sluice conditions is slightly less than 4 inches.

In the case of a tanker having pump means in its rear tank, initially during the unloading operation there will be a relative increase in the ship's draught at its bow. This is due to the fact that the rear tank is initially emptied faster than liquid can pass through the valve orifices from the bow of the tanker. The ship can be restored to zero trim conditions i.e. with the same draught at bow and stern during this initial phase by filling ballast compartments provided on either side of the rear tank. Then the ship can be set at a slight tilt from bow to stern i.e. with a slight additional draught at the stern so that draining from one compartment to another, through the valve openings, can take place under gravity.

The valve gates should be located as close as possible to the bottom of the compartments and this can be achieved by modifying the ship's bracing at this region or by any other suitable means.

A draining, drying or stripping manifold is

preferably provided at the bottom of each tank in order to complete the draining of the tanks. This manifold is also suitable for transferring cargo by sucking it from the tanks and delivering it through a deck manifold which as will subsequently be described is normally used for loading purposes.

The tanker is normally loaded under gravity by manifolds on its decks, the manifolds being connected through valves to each tank. The filling operation and cargo distribution can therefore be adjusted exactly as required as all tanks can be isolated from one another.

The weight of the pipe system of a tanker constructed as described above is about 50% less than that of a conventional tanker.

Other features and advantages of this invention will appear from the following description made with reference to the accompanying drawings which illustrate diagrammatically by way of example a typical tanker in accordance with one embodiment of the invention. In the drawings:—

Figure 1 is a diagrammatic plan view showing a tanker constructed according to the invention, the view being taken in the tank assembly;

Figure 1A illustrates on a larger scale the pump room;

Figure 2 is a fragmentary view of the upper deck;

Figure 2A shows on a larger scale certain details of the ship's structure;

Figure 3 is a diagrammatic view showing the mounting of the valve gates on the athwartships bulkheads;

Figure 4 is a section taken upon the line IV—IV of Figure 3, and

Figure 5 is a corresponding plan view.

Referring now particularly to Figure 1 of the drawings, the ship illustrated therein comprises central freight tanks 1, 2, 3, 4 and 5, and wing ballast tanks 6, 6^1, 7, 7^1 and 8, 8^1, 9, 9^1. In addition, wing freight tanks are shown at 10, 10^1 and 11, 11^1.

The central tanks 1, 2, 3, 4 and 5 are separated from one another by athwartships bulkheads 12, 13, 14 and 15. In those bulkheads, valve openings 16 and 17 of large area are formed; valve openings 16 and 17 are shown more in detail in Figures 3 to 5. In the bottom of the hold 18 longitudinally extending upstanding bracing members or stiffeners 19, 20, 21 and 22 may be arranged. Uprights 23 can also be arranged on the athwartships bulkheads 12 to 15. The valve openings 16 and 17 are provided with reinforcing frames 24. Mounted in front of these orifices are valve gates 25, for example of the sliding type, which may be controlled for example by means of handwheels 26 mounted in the manner shown in Figure 2. Of course, the displacements of the valve gates may be remote-controlled through any suitable and known means.

The reference numeral 27 (see Figure 1) designates the pump room. There are two essential pumps 28, and 29 intended for unloading the tanker. These pumps are connected through pipes 30 and 31 provided with gate valves 32 and 33 to a pair of suction plugs 34, 35 opening directly into the tank 5, that is the tank nearest to said pump room 27.

The pump room is also equipped with a so-called stripping or drying pump 36 for draining the tanks. This pump is connected through a duct 37 provided for example with gate valves 38 and 39 to the stripping pipe 40 extending along the tanks 1, 2, 3 and 4 and leading finally into the tank 5 at 41. Retarding the other tanks, connectors 42, 43, 44 and 45 provided with gate valves 46, 47, 48 and 49 connect the stripping pipe to suction plugs located near the bottom of the tanker hold.

If the tanker comprises additional freight tanks supplementing those arranged in its central portion, and notably port and starboard wing tanks, as shown at 10 and 10^1, the stripping pipe comprises special branch elements 50, 50^1 provided with gate valves 51 and 51^1 and suction plugs 52, 52^1 opening into said lateral tanks. When the tanker incorporates tanks located in the vicinity of the pumps, as in the case of tanks 11 and 11^1, other connectors 53 and 53^1 equipped with gate valves 54 and 54^1 and suction plugs 55 and 55^1 are provided in the stripping line.

If the tanker is of the type wherein the ballast is kept in special tanks, as in the case illustrated by way of example in the drawings, a so-called "ballast line" is associated with the port and starboard wing tanks. Two pumps 56 and 57 are provided to this end in the pump chamber and connected through ducts 58, 58^1 equipped with gate valves 59, 59^1 to a pair of lateral pipe lines 60, 60^1, provided with connectors 61, 61^1, 62, 62^1, 63, 63^1, and 64, 64^1, equipped with gate valves 65, 66, 67 and 68 and suction plugs 69, 70, 71 and 72 opening into the ballast tanks 6—6^1, 7—7^1, 8—8^1, and 9—9^1.

As illustrated in Figure 2, a plurality of "manifolds" pipes 73, 74 for filling the tanks are provided on the deck. These manifolds are connected through pipes 75, 76 and 77, 78 provided with gate valves 79, 80, 81 and 82, and lead directly into said tanks. Of course, transverse ducts may be provided to permit the filling of the port and starboard tanks. This is notably the case for athwartships lines 83, 84, provided with gate valves 85, 86 and leading to filler plugs 88, 89, 90 and 91.

When the ballast or freight tanks are located at the rear of the tanker, in the vicinity of the engine room, special ducts 93, 94 and 95 may be provided for connecting, through adequate valves 96, 97 and 98, these tanks to the suction pumps, stripping pumps and ballast pumps, as the case may be.

Of course, all the pipe lines or ducts may be multiplied and any suitable number thereof may be provided for transporting or handling liquid products such as fuel (lines 99, 100 in Figure 2*a*), freight, ballast, etc.

The operation of the installation so far described in very simple. When it is desired to fill the tanker this operation is carried out directly from the outside, on the upper deck, for example by means of the filling manifold or manifolds 73, 74 as shown in Figure 2. Beforehand, the various gates provided in the athwartships bulkheads separating the different tanks are carefully closed. Of course, if desired, these tanks may be filled in a selective manner.

When the tanker is to be unloaded, the operator simply opens the valve gates 25 and starts the pumps for sucking the liquid directly from the tank nearest to the pump room, in this case the tank 5. The suction created in this tank causes the successive or cascade flow of liquid from one tank to the adjacent tank and so forth, until the last tank 5 is exhausted directly by the pump. Simultaneously with this operation, the tanker may be ballasted by utilizing to this end the ballast manifolds. Moreover the tanker may be placed in a bows up orientation by filling ballast tanks in the vicinity of the engine room.

Immediately as the various tanks are emptied, they are dried by utilizing to this end the drying and stripping manifold.

From the foregoing it is clear that by properly operating the suction and ballast pumps alternately or simultaneously it is possible to give any desired inclination to the tanker for successively causing the liquid cargo to flow from one tank to another and finally unloading the ship completely.

Similarly, by properly arranging and operating the stripping manifold and the loading manifolds 73, 74 in relation to one another, the liquid may be transferred from one tank to another without any difficulty.

Of course, the same principle of unloading or draining tanks may be applied, if desired, to the operation of ballast tanks.

Again, when the tanker is not provided with special ballast tanks and the ballasting operation is effected by utilizing the freight tanks or compartments to this end, the ballasting and/or unballasting operations are effected by means of one or more so-called manifold pipes each connected on the one hand to a pump and on the other hand and separately to all the tanks concerned.

In the case of a large tanker more than one tank arrangement as described above can be arranged in the storage part of the tanker.

WHAT WE CLAIM IS:—

1. A tanker in which the tanks are defined by fore-and-aft and athwartships bulkheads wherein the lower portions of the athwartships bulkheads are provided with valve openings of large area which are arranged to be closed by gates having control means operable from outside the tanks, and wherein high capacity pump means are connected to one of the said tanks in such manner that during emptying (or filling) of the tanks liquid can flow from tank to tank to (or from) the said pump means in the fore-and-aft direction of the tanker by way of the valve openings.

2. A tanker as claimed in Claim 1, wherein ballast tanks are provided such that the ship can be so trimmed that liquid can flow from tank to tank from the said orifices under gravity.

3. A tanker as claimed in Claim 2, wherein the high capacity pump means are positioned adjacent a tank at the stern of the tanker.

4. A tanker substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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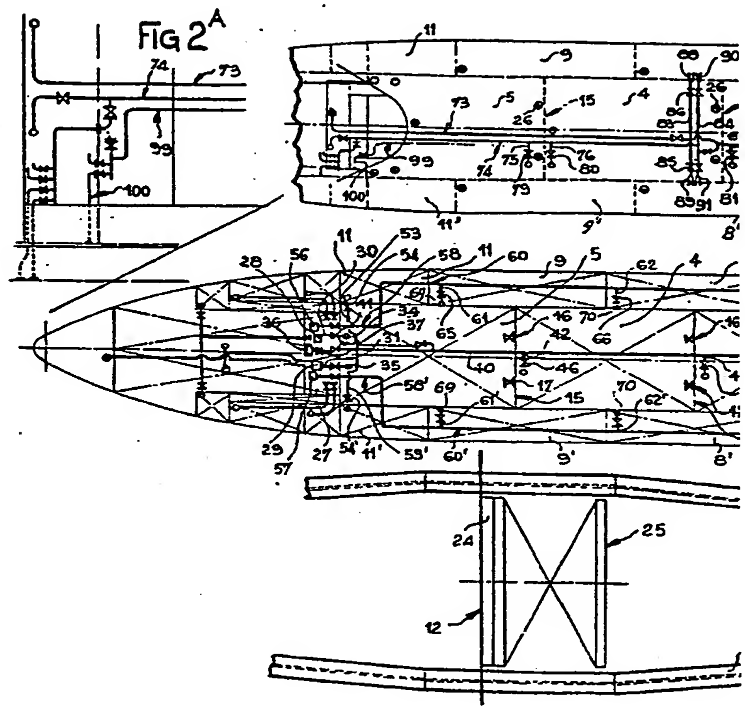
FIG 2A



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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

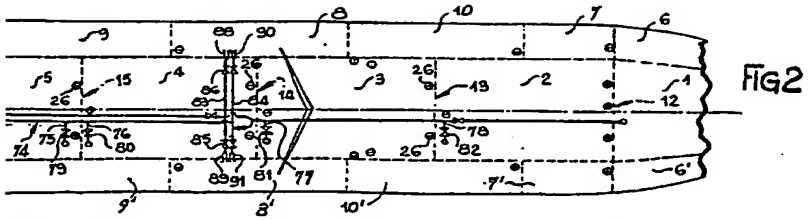

FIG2

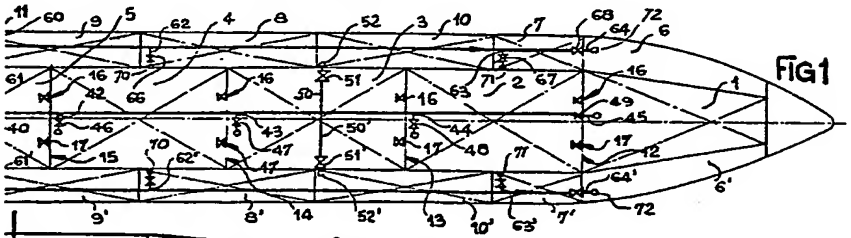

FIG1

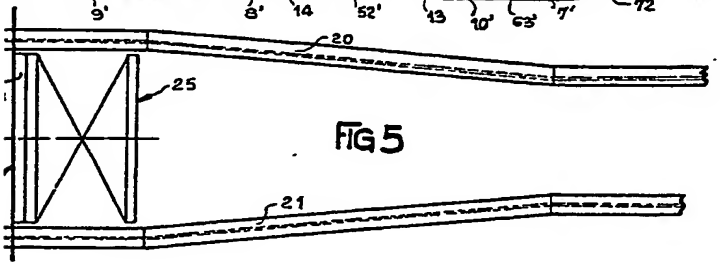

FIG5

925102 COMPLETE SPECIFICATION

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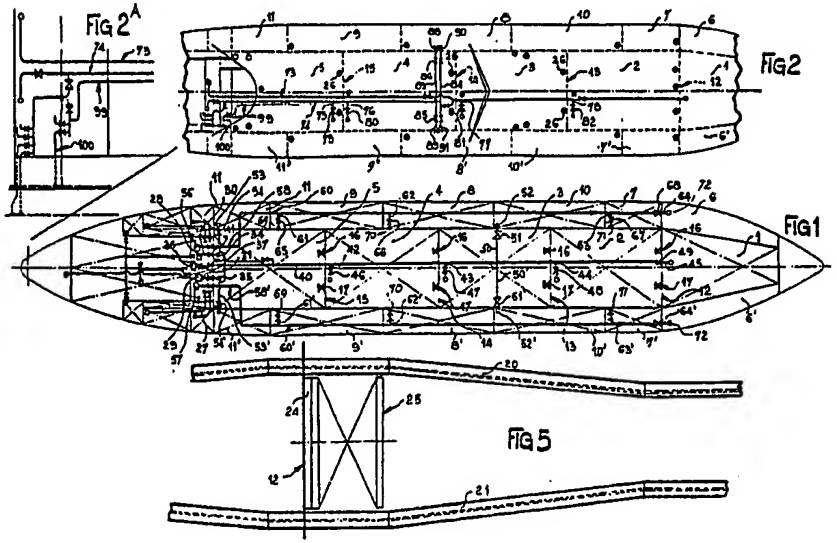
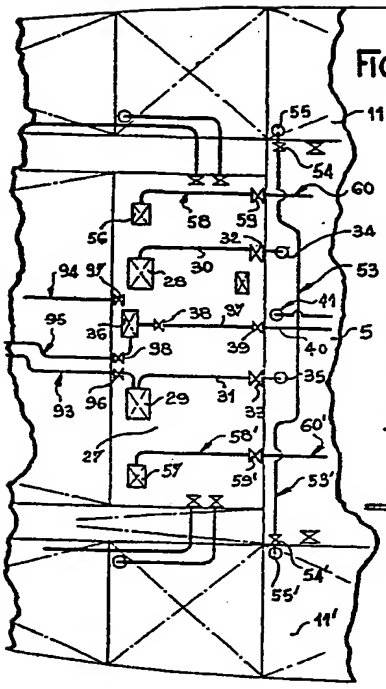


FIG 1 A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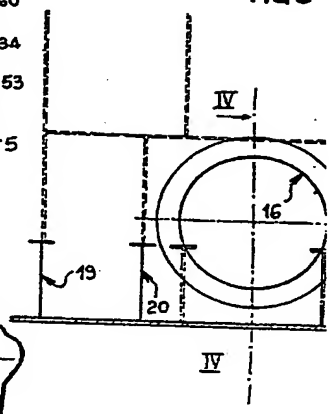
11'

FIG 3


IV
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IV

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Sheet 2

FIG 3

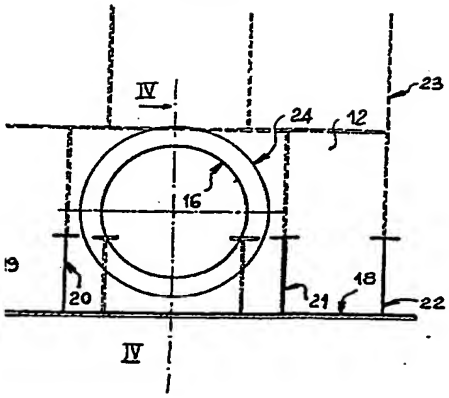
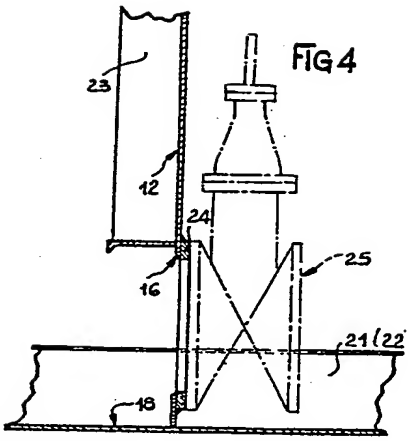


FIG 4



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Sheet 2